COMPARISON OF MEAN GLANDULAR DOSE IN A SAMPLE OF PATIENTS FROM COLOMBIA AND BRAZIL

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1. INTRODUCTION

Screening mammography is the method used to detect breast cancer, but this practice has an associated radiological risk related with the dose deposited in the glandular tissue of the breast. Mean Glandular Dose, MGD, is accepted as indicating the extent of radiological risk, which is estimated according to international protocols, according Half Value Layer (HVL) , X-ray spectrum used and the compressed breast thickness (CBT) and considering a standard breast glandular 50%.

2. OBJECTIVES

The aim of this study was to estimate the Mean Glandular Dose in two mammography centers, one on Medellin (Colombia) and other in Belo Horizonte (Brazil).

3. MATERIALS AND METHODS

The centers were selected randomly, they were evaluated and exposure conditions of each mammogram were recorded. In both centers, mammography was performed a quality control program, which measured the output of the equipment, half-value layer HVL and quality control of the image, quality criteria were acceptable. Then, the values registered were the compressed breast thickness, CBT, tube potential (kV), tube load (mAs) and the type of view projection, CranioCaudal (CC) and Mediolateral Oblique (MLO) for 50 patients in each center.
The technical characteristics of mammography equipment used in each of the ten centers are shown in Table 1.

Table 1. Equipment specifications and Performance and HVL measured

Center	Colombia	Brazil
Manufacturer	GE Medical System	GE Medical System
Ánode/ Filter	Mo/Mo	Mo/Mo Mo/Rh
Focus to film Distance (FFD) (cm)	64	66
performance (µGy/mAs)	43,0	37,0 Mo/Mo 31,0 Mo/Rh
HVL (mmAl)	0,37	0,37 Mo/Mo 0,43 Mo/Rh

The study of image quality was evaluated using the methodology proposed in the TECDOC 1517, this was made with the American College of Radiology (ACR) phantom in Colombia and with the Brazilian College of Radiology (CBR) phantom in Brazil. The result of quality control in the equipments in both countries is shown in Figure 1.

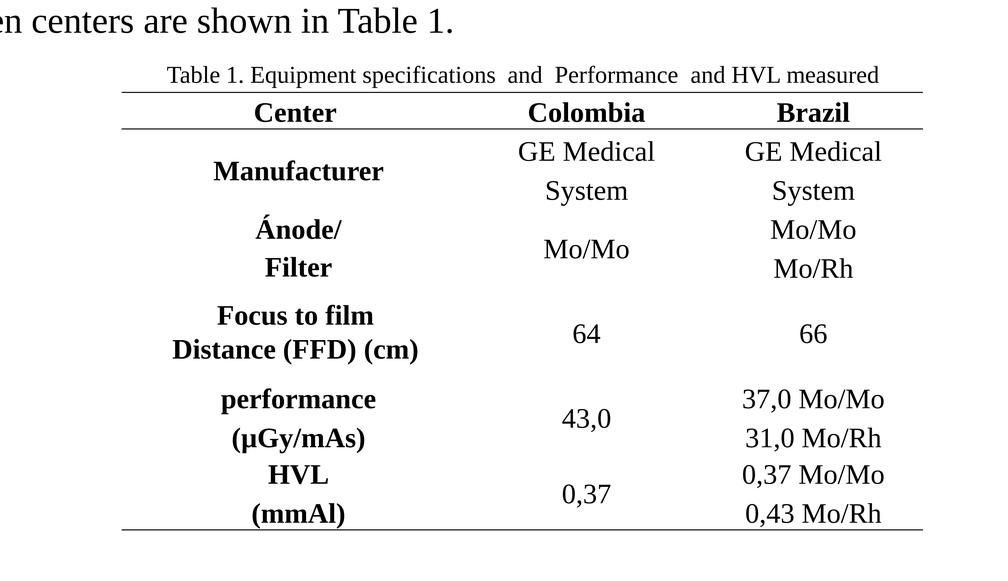

Figure 1. Evaluation of Quality Control of the image.

To estimate Mean Glandular Dose, MGD, determined the entrance surface air kerma (K) of the breast using the following relationship:

$$K\ (mGy) = \frac{R\ (mGy * m^2/mAs) * C(mAs)}{DFP_A^2(m^2)}$$

where *R* is the performance at 1 meter, corresponding to the anode-filter combination used and kilovoltage applied, *C* is the applied load and *DFP* is the distance from the focus to the input of the breast. Glandular Dose Media is obtained:

$$MGD = K.g.c.s$$

where *g* is the conversion factor from air kerma without backscatter in MGD, the factor *c* corrects for any difference in breast composition from 50% glandularity and the factor *s* corrects for any difference due to the use of a different x-ray spectrum.

4. RESULTS AND DISCUSSIONS

The average MGD for the sample of patients in Colombia was 1.36 ± 0.83 mGy and 2.05 ± 0.78 mGy for the sample of patients in Brazil, was take into account a percentage 50% glandular tissue and using conversion factors g of Dance.

Figure 2 shows significant differences were found between MGD from CC and MLO projections. The dose in the MLO projection is always greater than the dose in the CC.

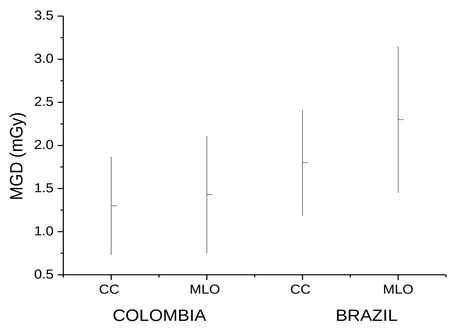

Figure 2. Average value of MGD for CC and MLO projections

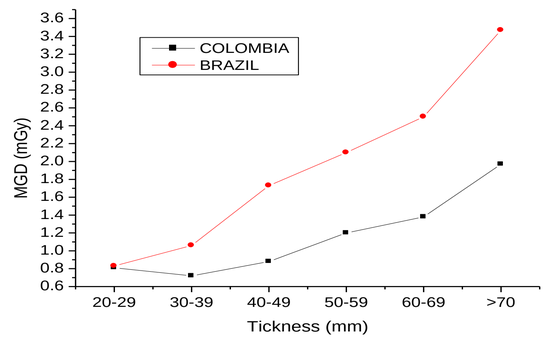

Figure 3. MGD according to the CBT

The curves in Figure 3 shows the trend of MGD, which increases with increasing compressed breast thickness. This trend of increased MGD with compressed breast thickness was also reported by others authors.

5. CONCLUSION

The average dose of two centers, are below guideline levels of dose proposed by international protocols. The average values of the MGD for the CC are greater than the average values of dose for the MLO view. Finally we found that the MGD increases with breast thickness.

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